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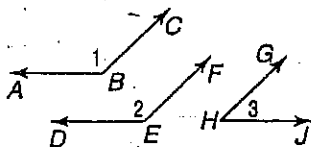
Study Guide and Intervention (continued)

Proving Angle Relationships

Congruent and Right Angles Three properties of angles can be proved as theorems.

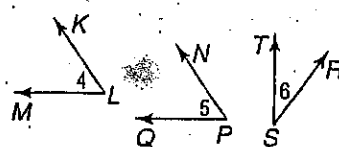
Congruence of angles is reflexive, symmetric, and transitive.

Angles supplementary to the same angle or to congruent angles are congruent.



If $\angle 1$ and $\angle 2$ are supplementary to $\angle 3$,
then $\angle 1 \cong \angle 2$.

Angles complementary to the same angle or to congruent angles are congruent.



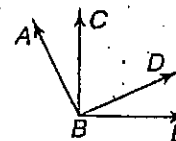
If $\angle 4$ and $\angle 5$ are complementary to $\angle 6$,
then $\angle 4 \cong \angle 5$.

Example

Write a two-column proof.

Given: $\angle ABC$ and $\angle CBD$ are complementary.
 $\angle DBE$ and $\angle CBD$ form a right angle.

Prove: $\angle ABC \cong \angle DBE$



Statements

- $\angle ABC$ and $\angle CBD$ are complementary.
 $\angle DBE$ and $\angle CBD$ form a right angle.
- $\angle DBE$ and $\angle CBD$ are complementary.
- $\angle ABC \cong \angle DBE$

Reasons

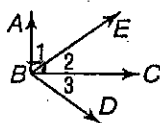
- Given
- Complement Theorem
- Angles complementary to the same \angle are \cong .

Exercises

Complete each proof.

1. **Given:** $\overline{AB} \perp \overline{BC}$;
 $\angle 1$ and $\angle 3$ are
complementary.

Prove: $\angle 2 \cong \angle 3$



Statements

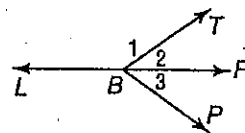
- $\overline{AB} \perp \overline{BC}$
- $\angle ABC$ is a rt \angle
- $m\angle 1 + m\angle 2 = m\angle ABC$
- $\angle 1$ and $\angle 2$ form a rt \angle .
- $\angle 1$ and $\angle 2$ are compl.
- $\angle 1 + \angle 3$ are compl
- $\angle 2 \cong \angle 3$

Reasons

- Given
- Definition of \perp
- A.A.P.
- Substitution
- Compl. thm
- Given
- Compl. of $\cong \angle$ s are \cong

2. **Given:** $\angle 1$ and $\angle 2$
form a linear pair.
 $m\angle 1 + m\angle 3 = 180$

Prove: $\angle 2 \cong \angle 3$



Statements

- $\angle 1$ and $\angle 2$ form a linear pair.
 $m\angle 1 + m\angle 3 = 180$
- $\angle 1 + \angle 2$ are suppl
- $\angle 1$ is suppl. to $\angle 3$.
- $\angle 2 \cong \angle 3$

Reasons

- Given
- Suppl. Theorem
- Def of suppl
- \angle suppl. to the same \angle are \cong .

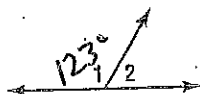
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Skills Practice

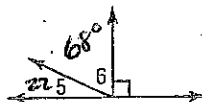
Proving Angle Relationships

Find the measure of each numbered angle.

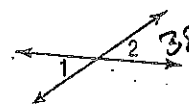
1. $m\angle 2 = 57$



2. $m\angle 5 = 22$



3. $m\angle 1 = 38$



4. $m\angle 13 = 4x + 11$,
 $m\angle 14 = 3x + 1$

5. $\angle 9$ and $\angle 10$ are
complementary.
 $\angle 7 \cong \angle 9$, $m\angle 8 = 41$

6. $m\angle 2 = 4x - 26$,
 $m\angle 3 = 3x + 4$

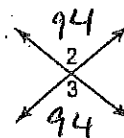
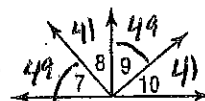
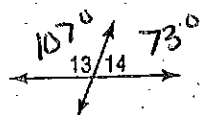
$$4x - 26 = 3x + 4$$

$$x = 30$$

$$7x + 12 = 180$$

$$7x = 168$$

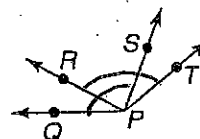
$$x = 24$$

Determine whether the following statements are *always*, *sometimes*, or *never* true.7. Two angles that are supplementary form a linear pair. *Sometimes*8. Two angles that are vertical are adjacent. *Never*

9. Copy and complete the following proof.

Given: $\angle QPS \cong \angle TPR$ Prove: $\angle QPR \cong \angle TPS$

Proof:



Statements

Reasons

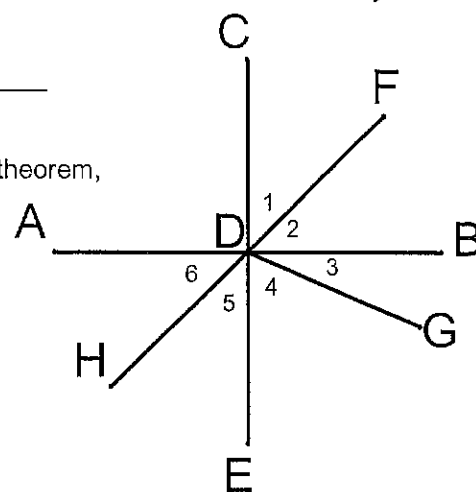
a. _____

a. *Given*b. $m\angle QPS = m\angle TPR$ b. *Def of \cong* c. $m\angle QPS = m\angle QPR + m\angle RPS$
 $m\angle TPR = m\angle TPS + m\angle RPS$ c. *AA*d. $m\angle QPR + m\angle RPS = m\angle TPS + m\angle RPS$ d. *Substitution*e. $m\angle RPS = m\angle RPS$ e. *Reflexive*f. $m\angle QPR = m\angle TPS$ f. *Subtr*g. $\angle QPR \cong \angle TPS$ g. *Def of \cong*

Name _____ Date _____
202 Chapter 2 Worksheet

Justify the following statements with a definition, postulate, property, theorem, etc...

1. SAP $AD + DB = AB$
2. AAP $m\angle 1 + m\angle 2 = m\angle CDB$
3. Add If $AD = BD$ and $CD = DE$,
then $AD + CD = BD + CE$.
4. Vert. \angle s \cong $\angle 2 \cong \angle 6$
5. Def. \angle Bis If \overline{DF} bisects $\angle CDB$, then $m\angle 1 = m\angle 2$.
6. Def. of midpoint If D is the midpoint of AB , then $AD = DB$.
7. Def. of \perp lines If $CD \perp AB$, then $\angle CDB$ is a right angle.
8. Def. of rt. \angle If $\angle CDB$ is a right angle, $m\angle CDB = 90$.
9. Suppl. thm Look at the picture, $\angle ADF$ and $\angle FDB$ are supplementary.
10. Def. of suppl. If #9 is true, then $m\angle ADF + m\angle FDB = 180$.
11. Def. of compl. If $m\angle 1 + m\angle 2 = 90$, then $\angle 1$ and $\angle 2$ are complementary.
12. Compl. of $\cong \angle$ s are \cong If $\angle 4$ and $\angle 5$ are complementary and $\angle 6$ and $\angle 5$ are complementary, then $\angle 4 \cong \angle 6$.
13. Suppl. of $\cong \angle$ s are \cong If $\angle 1$ and $\angle 2$ are supplementary and $\angle 2$ and $\angle 3$ are supplementary, then $\angle 1 \cong \angle 3$.



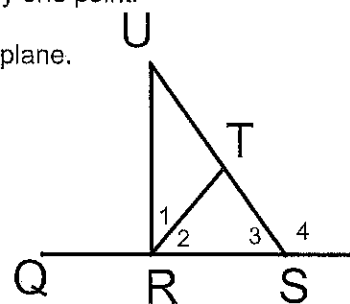
Complete with always, sometimes, or never.

14. Two points A lie in exactly one line.
15. Three points S lie in exactly one line.
16. Three points S lie in exactly one plane.
17. Three collinear points N lie in exactly one plane.
18. Two planes S intersect.
19. Two intersecting planes N intersect in exactly one point.
20. Two intersecting lines A intersect in exactly one point.
21. Two lines S intersect in exactly one point.
22. Two intersecting lines A lie in exactly one plane.

Write proofs for the following problems.

23. Given: $\angle 2$ and $\angle 4$ are supplementary
Prove: $\angle 2 \cong \angle 3$

<p><u>S</u></p> <p>① ~</p> <p>② $\angle 3 + \angle 4$ are suppl</p> <p>③ $\angle 2 \cong \angle 3$</p>	<p><u>R</u></p> <p>① Given</p> <p>② Suppl. thm</p> <p>③ Suppl. of $\cong \angle$s are \cong</p>
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24. Given: $\angle 1 \cong \angle 2$; $\angle 3 \cong \angle 4$
Prove: $\angle ABC \cong \angle DEF$

<p>① ~</p> <p>② $m\angle 1 = m\angle 2$; $m\angle 3 = m\angle 4$</p> <p>③ $m\angle 1 + m\angle 3 = m\angle 2 + m\angle 4$</p> <p>④ $m\angle 1 + m\angle 3 = m\angle ABC$ $m\angle 2 + m\angle 4 = m\angle DEF$</p> <p>⑤ $m\angle ABC = m\angle DEF$</p> <p>⑥ $\angle ABC \cong \angle DEF$</p>	<p>① Given</p> <p>② Def of \cong</p> <p>③ Add</p> <p>④ AAP</p> <p>⑤ Subst</p> <p>⑥ Def of \cong</p>
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